

# PATENT SPECIFICATION

DRAWINGS ATTACHED

880,502



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## COMPLETE SPECIFICATION

### Wire Packaging Machine and Method

We, THE VAUGHN MACHINERY COMPANY, a corporation organised and existing under the laws of the State of Ohio, United States of America, of Cuyahoga Falls, Ohio, United States of America, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 The present invention relates generally as indicated to a wire packaging machine and method and more particularly to a wire packaging machine and method by which neat and compact packages or coils are produced.

15 In the wire packaging art it is known to provide wire take-up or draw blocks and wire-receiving containers that are relatively rotated at varying speed ratios so as to form convolutions of varying diameter, thereby tending to make the coils compact and neat. However, such neat packaging of wire involves the use of a complicated and expensive variable drive system.

Accordingly, it is one principal object of this invention to provide a wire packaging machine and method which does not require any such complex speed varying means, because the machine herein is, in essence, a dead block-dead coil machine except for the provision of a turntable beneath the draw block which is arranged to be very slowly rotated about an axis which is offset from the axis of the draw block. In this way, the uniform diameter convolutions of wire descending by gravity from the draw block are laid neatly and compactly in circular progression to form an annular package which is of outside diameter larger than the diameter of the individual convolutions. A package thus formed is very compact in that it contains a great weight of wire in relation to its diameter and height.

It is another object of this invention to provide a wire packaging machine and method in which the turntable on which the package is formed is rotated about an axis that is inclined

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with respect to the normal vertical path of descent of the wire convolutions, the turntable being provided with a similarly inclined guide to effect build up of an annular package of uniform diameter.

It is another object of this invention to provide a wire packaging machine and method as above indicated, in which means are provided for adjusting the eccentricity of the turntable axis with respect to normal vertical axes of the descending convolutions from the draw block thus to form packages or coils of different outside diameters.

It is another object of this invention to provide a wire packaging machine and method as indicated in which the turntable may be shifted from tilted position to horizontal position thereby to position the coil in vertical position to facilitate removal thereof from the turntable.

It is another object of this invention to provide a wire packaging machine and method which employs a novel guide for the wire convolutions as they pass from the draw block onto the coil support.

It is another object of this invention to provide a wire packaging machine and method which makes provision for continuous operation by the use of an accumulator operative to support the convolutions while removing a completed package from the machine, whereupon the accumulated coils may then be released onto the empty turntable or into an empty wire-receiving container.

It is another object of this invention to provide a wire packaging machine and method which may be used in conjunction with a horizontal take-up block from which the convolutions are guided around a horn onto the offset and slowly rotating turntable.

Other objects and advantages of the present invention will become apparent as the following description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, comprises

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the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawings setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawings:—

10 Fig. 1 is a front elevation view of one form of wire packaging machine embodying the present improvements;

Fig. 2 is a cross-section view taken along the line 2—2, Fig. 1;

15 Fig. 3 is a cross-section view taken along the line 3—3, Fig. 1;

Fig. 4 illustrates a modified form of wire receiver; and

20 Fig. 5 is a side elevation view diagrammatically showing yet another form of coil receiver arranged to receive convolutions from a horizontal take-up block with the convolutions guided over a horn, the latter preferably being provided with an accumulator whereby a 25 plurality of convolutions of the wire are collected for periodic release as hanks to the receiver therebeneath.

Referring now in detail to the drawings, and first to the form of the machine shown in 30 Figs. 1, 2, and 3, the same comprises a head 1 having a vertical tubular shaft 2 fixed therein with a sheave 3 at the top and with a swivel sheave 4 at the bottom. The take-up block assembly 5 fixed to the lower end of the shaft 35 2 may be of the type, disclosed in my copending application Serial No. 14630/60 (Serial No. 800,500), wherein a plurality of nested blocks have threaded engagement with shaft 2 so that one or more of the outer ones may be screwed 40 upwardly to expose an inner one of smaller diameter. However, for present purposes, the take-up block assembly 5 may be of any conventional form mounted as a dead block on such a fixed tubular shaft 2.

45 Journalled on the fixed tubular shaft 2 is the flyer assembly 6 which is arranged to be rotated about the axis of the take-up block 5 as by means of the belt drive 7 from the speed reducer 8, which speed reducer, in turn, is 50 belt-driven as at 9 by the electric drive motor 10 which is mounted in the head 1. The flyer assembly 6 is provided with a sheave 11, whereby as the flyer assembly 6 is rotated, the wire W passing over the top sheave 3, through 55 the shaft 2, over the swivel sheave 4, and over the sheave 11 as shown, is wrapped on the take-up block at the beveled shoulder 14 thereof, whereby the convolutions will be progressively shoved upwardly until the top convolution clears the pressure roller 15 on the 60 flyer assembly 6 which holds the convolutions against the periphery of the block 5. As the flyer assembly 6 thus rotates, the successive top convolutions of wire W are free to con- 65 tinuously gravitate through the funnel-shaped

guide 16 mounted on the forwardly extending arms 17 of the head 1 onto the top surface of the turntable 18. The aforesaid funnel support arms 17 are also provided with accumulator 70 fingers 19 which may be swung about vertical axes to position the fingers 19 in the path of descent of the wire convolutions from the take-up block 5 thereby to accumulate in the guide a number of turns of the wire W to permit 75 removal of a completed coil or package from the turntable 18 preparatory to starting the next coil. When the completed coil has been removed, the fingers 19 may be swung out from under the convolutions of wire W accumulated thereon, whereby the hank of con- 80 volutions drops down to the turntable, the flyer 6 being operated continuously.

As shown in Figs. 1 to 3, the turntable 18 herein may be provided with a roller conveyor 20 to facilitate removal of a completed coil 85 supported on the platform 21. In the operating position of the turntable 18 it has an axis of rotation which is offset from the axis of the take-up block 5 and inclined from vertical as shown, and has a bracket 23 on which three 90 circumferentially spaced and parallel rolls 24 are supported for rotation about axes that are parallel to the axis of rotation of the turntable 18.

The inclination of the turntable 18 and the 95 length of the rolls 24 is such that the upper ends of the rolls 24 are at a zone to be engaged by one side of the wire convolutions as they pass down from the take-up block 5 through the guide funnel 16. In this way the convolu- 100 tions will be displaced laterally to form a neat package of radius equal to the distance of the rolls 24 from the axis of the turntable 18.

The turntable 18 is provided with a center 105 shaft by which it is driven as through an electric motor 25 and suitable gearing 26, at a very slow speed in relation to the speed of the flyer 6. For instance, the ratio of speed of the flyer 6 with respect to the speed of the 110 turntable 18 may be on the order of 800 : 1. It has been found that in a machine employing a 4 h.p. d.c. drive motor 10 for the flyer 6 requires only a  $\frac{1}{2}$  h.p. d.c. motor 25 to drive the 115 turntable 18, even when a large coil of 2,000 lbs. weight is to be made.

As best shown in Fig. 2, the convolutions of 120 diameter D engage the rolls 24 adjacent their upper ends and slide down and laterally along said rolls, and build up on the coil support platform 21. Because the turntable 18 is rotating slowly, for instance, in the direction shown by the arrow in Fig. 2, the convolutions will be laid in circular progression to produce a neat and compact coil which has an outside 125 diameter E and an inside diameter F. By way of example, a coil of 31" outside diameter E, 11" inside diameter F, and of 17" height when formed of 16  $\frac{1}{2}$  gauge carbon steel wire, has a weight of over 1,250 lbs. Thus, it is 130 possible to build up heavy coils which are neat

and compact and from which the wire can easily be payed off without tangling or snarling, and, if desired, a tubular core or the like, may be inserted in the center. The aforesaid 5 2,000 lbs. coil would have a height of about 40" and outside and inside diameters of about 29" and 14" respectively, while the wire convolutions are of about 22" diameter D.

A coil formed as just described, may be 10 bundled as with steel tapes, or if desired, a cylindrical wire-receiving drum may be mounted on the platform 21, or on the turntable 18, to accumulate the convolutions in the manner shown in Fig. 2.

15 It is to be noted that the turntable 18 and its support housing 29 are mounted on a horizontal pivot 30 for movement as a unit to position the top of the turntable from its tilted position 18 in a horizontal plane as by 20 means of the pneumatic cylinder 31. Furthermore, the member 32 carrying the horizontal pivot shaft 3 is adjustable to move the rolls 24 closer to, or farther away from, the vertical axis of the take-up block 5. Said adjustable 25 member 32 has an arm 33 which may be secured, as by the screw 34 at different positions. The member 32 may be supported as on the rollers 35 of a member 36 fixed in the bottom of the floor well 37.

30 As shown in Fig. 1, the machine is preferably provided with a start-stop, push button 38, a speed control wheel 39, and a valve 40 for actuating the cylinder 31, the wiring and piping diagrams not being shown herein since 35 they may be conventional.

Referring now to Fig. 4, the turntable there shown, is somewhat in the form of a basket 45 which is slowly rotated about an inclined and offset axis so as to accumulate the wire convolutions therein.

40 Finally, as shown in Fig. 5, the turntable 50 may be provided with an upstanding inclined core 51 along which the convolutions of wire W descend from the down-turned portion of 45 the horn 52, the upper inclined portion of the horn 52 receiving convolutions of wire W from the horizontal take-up block 53 which may be of the same construction as shown in Fig. 3 except mounted in a horizontal position rather 50 than in vertical position.

The curved and downwardly sloping portion of the horn 52 is provided with a pivoted, counterweighted accumulator finger 54 which 55 causes several convolutions of wire W to hang thereat until the weight thereof is sufficient to turn the finger 54 to dotted position whereat the accumulated convolutions drop down and be displaced laterally as a hank along one side of 60 the inclined core 51. Thus, the hanks of wire will be laid in circular progression to form a neat and compact package. The accumulator finger 54 also is useful in accumulating the convolutions of wire W while a completed coil 65 preparatory to starting the next coil.

#### WHAT WE CLAIM IS:—

1. In a wire packaging machine, the combination of a take-up block arranged to have wire coiled thereabout with the convolutions descending by gravity therefrom; a support for 70 accumulating such convolutions in the form of an upwardly growing package; and means operative to rotate said support about an upwardly extending axis that is offset with respect to the axis of the descending convolutions whereby the convolutions are laid neatly 75 and compactly in circular progression on said support to form an annular package of outside diameter larger than the diameter of the individual convolutions.

2. The machine of claim 1 wherein the axis of rotation of said support is inclined from 80 vertical, said support having guide means effective to guide the convolutions so that they drop down on the low side of said support 85 and on the low side of the package as it grows.

3. The machine of claim 1 wherein said support has guide means effective to cause the descending convolutions to accumulate eccentrically with respect to the axis of rotation of 90 said support.

4. The machine of claim 1 wherein an accumulator is disposed between said block and support, said accumulator being operative to 95 arrest the descent of the convolutions and thus to accumulate a hank of convolutions for subsequent release to said support.

5. In a wire packing machine, the combination of a fixedly mounted take-up block; a 100 flyer mounted for rotation about said block and including wire guide means operative to wrap wire around said block to form convolutions which descend by gravity from said block; a support disposed at a level below said 105 block for accumulating such convolutions in the form of an upwardly growing package; and drive means operative to rotate said support very slowly in relation to the speed of said flyer about an upwardly extending axis that is 110 offset with respect to the axis of the descending convolutions whereby the convolutions are laid neatly and compactly in circular progression on said support to form an annular package of outside diameter larger than the 115 diameter of the individual convolutions.

6. The machine of claim 5 wherein the axis of rotation of said support is inclined from 120 vertical, said support having guide means effective to guide the convolutions so that they drop down on the low side of said support and on the low side of the package as it grows.

7. The machine of claim 5 wherein said support has guide means effective to cause the descending convolutions to accumulate eccentrically with respect to the axis of rotation of 125 said support.

8. The machine of claim 5 wherein an accumulator is disposed between said block and support, said accumulator being operative 130 to arrest the descent of the convolutions and

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thus to accumulate a bank of convolutions for subsequent release to said support.

9. In a wire packaging machine, the combination of a housing; a vertical take-up block dependingly secured to said housing; a flyer journaled in said housing for rotation about a vertical axis and including wire guide means operative to wrap wire around said block to form convolutions which descend by gravity from said block; a support disposed beneath said block and flyer for accumulating such convolutions in the form of an upwardly growing package; and drive means operative to rotate said support very slowly in relation to the speed of said flyer about an upwardly extending axis that is offset with respect to the axis of the descending convolutions whereby the convolutions are laid neatly and compactly in circular progression on said support to form an annular package of outside diameter larger than the diameter of the individual convolutions.

10. The machine of claim 9 wherein a funnel-shaped member is mounted between said block and said support for guiding the convolutions as they drop therethrough.

11. The machine of claim 10 wherein said funnel-shaped member has an accumulator movable into the path of descent of the convolutions to collect a bank of convolutions in said member during the time that a completed package is removed from said support.

12. In a wire packaging machine, the combination of a housing; a horizontal take-up block secured to said housing to project horizontally therefrom; a flyer journaled in said housing for rotation about a horizontal axis and including wire guide means operative to wrap wire around said block to form convolutions that are pulled off horizontally from said block; a horn adjacent said block operative to turn the convolutions to generally horizontal position for descent by gravity; a support disposed beneath said horn for accumulating

such convolutions in the form of an upwardly growing package; and drive means operative to rotate said support very slowly in relation to the speed of said flyer about an upwardly extending axis that is offset with respect to the axis of the descending convolutions whereby the convolutions are laid neatly and compactly in circular progression on said support to form an annular package of outside diameter larger than the diameter of the individual convolutions.

13. The machine of claim 12 wherein said horn is provided with an accumulator operative to arrest the descent of the convolutions and thus to accumulate a bank of convolutions for subsequent release to said support.

14. The method of forming a neat and compact annular package of wire and the like which comprises the steps of continuously forming wire convolutions of substantially uniform diameter, progressively laying the convolutions by gravity onto a support therebelow to produce an upwardly growing package, and slowly rotating the support about an upwardly extending axis that is offset with respect to the axis of the convolutions whereby the convolutions are laid in circular progression on said support and on the growing package to form an annular package that is of outside diameter greater than the diameter of the individual convolutions.

15. The method of claim 14 wherein the descent of the convolutions is periodically interrupted so as to build up a bank of convolutions for subsequent release onto said support.

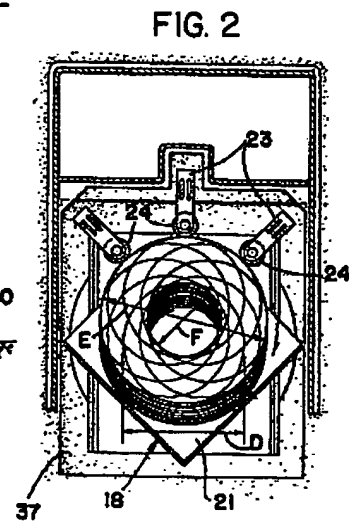
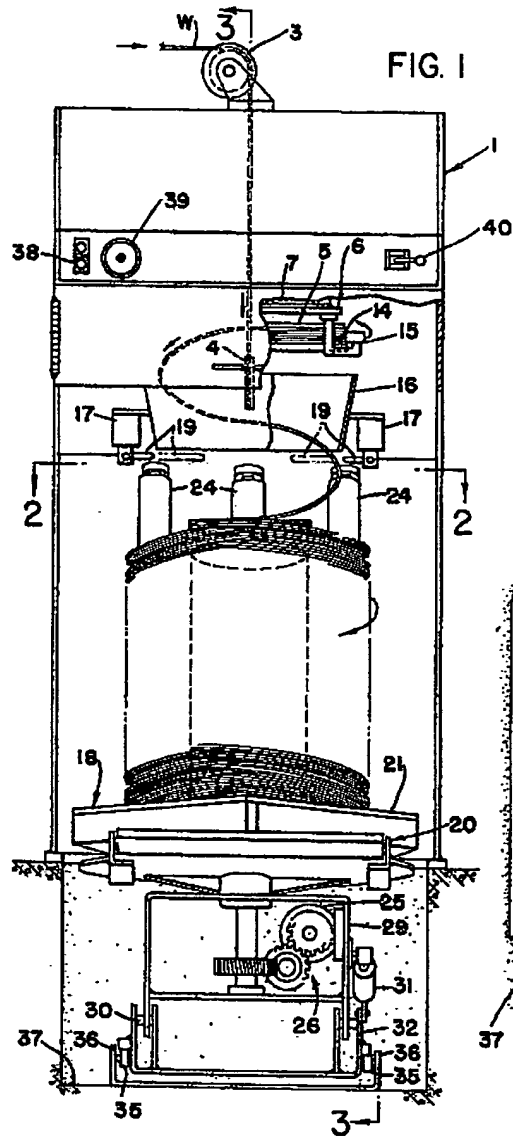
16. A wire-packaging machine substantially as described herein with reference to the accompanying drawings.

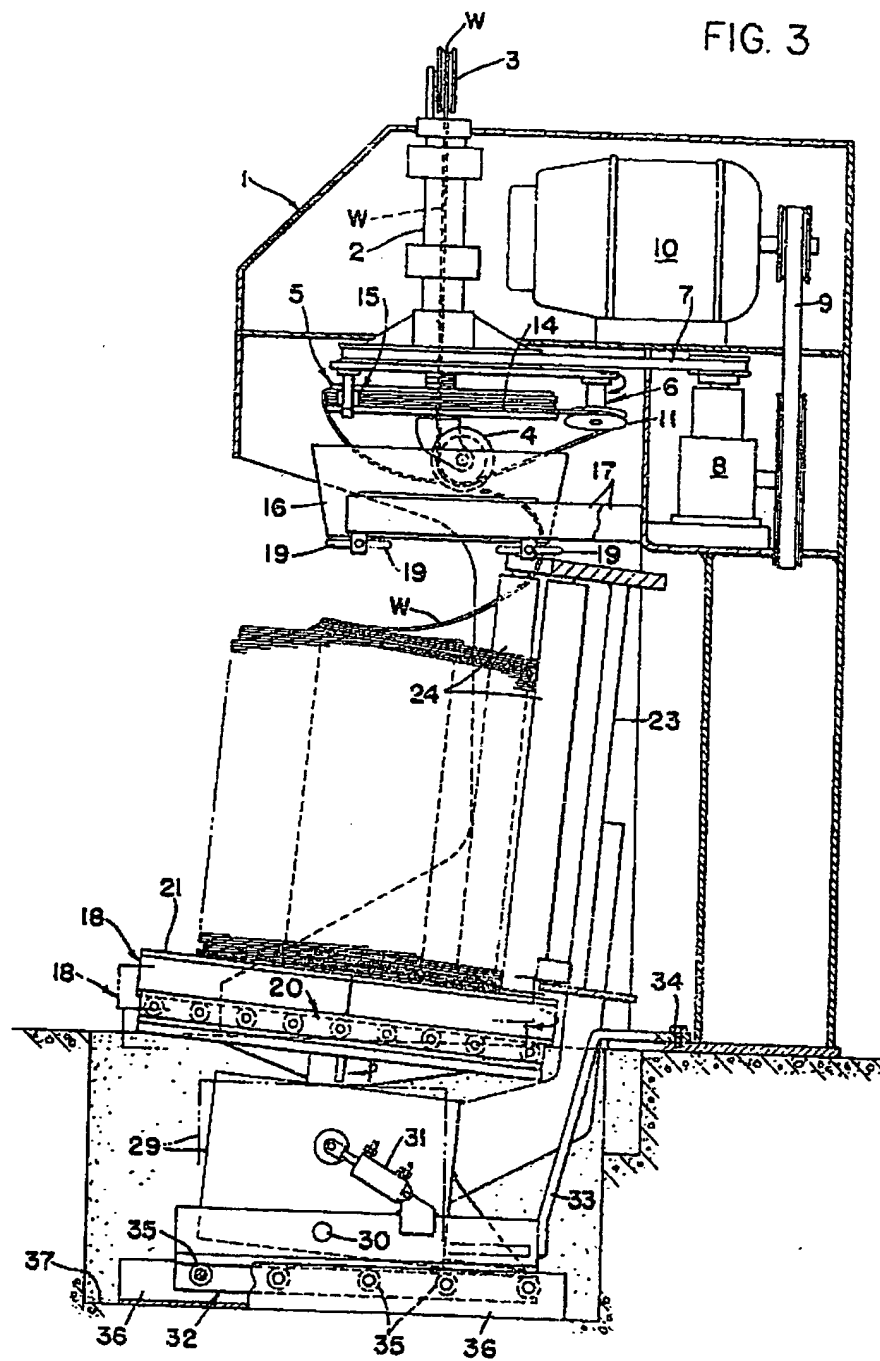
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3 SHEETS

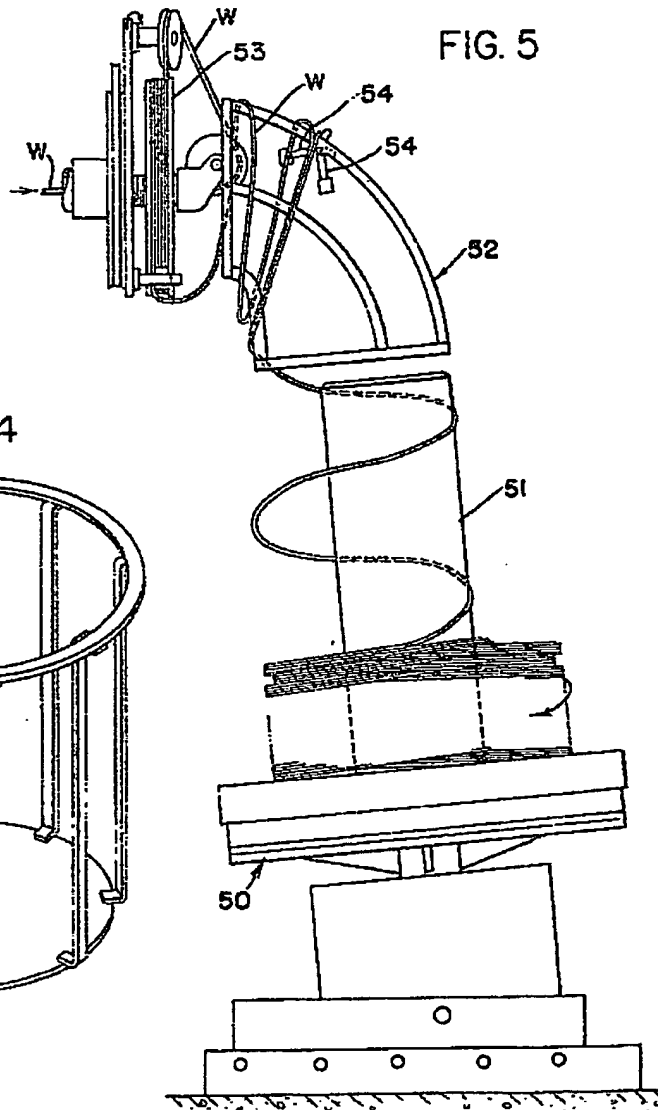
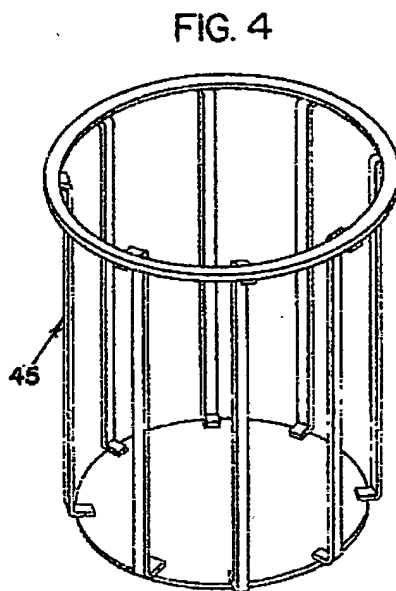
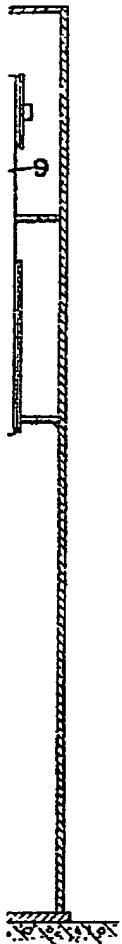
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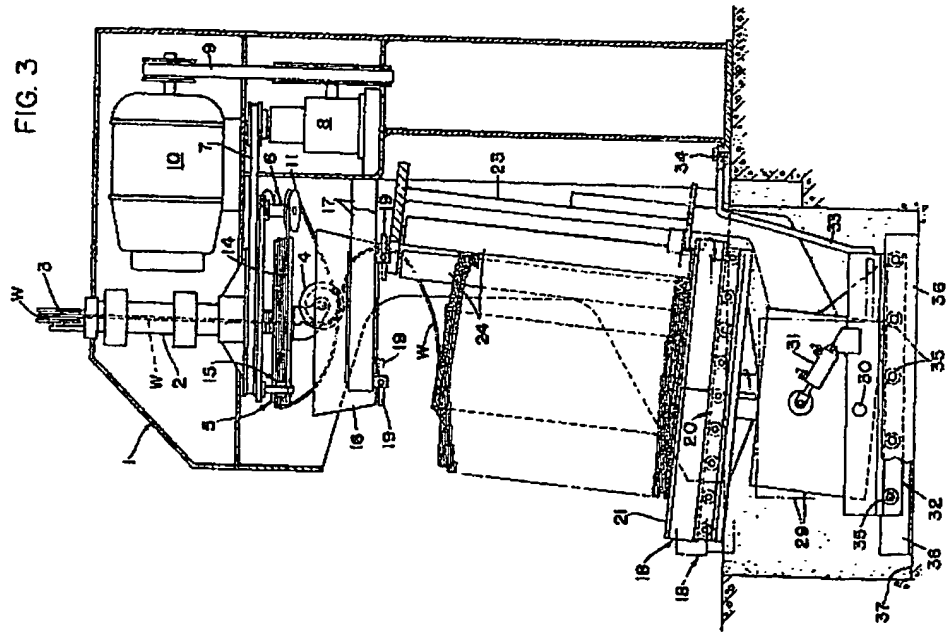


FIG. 3

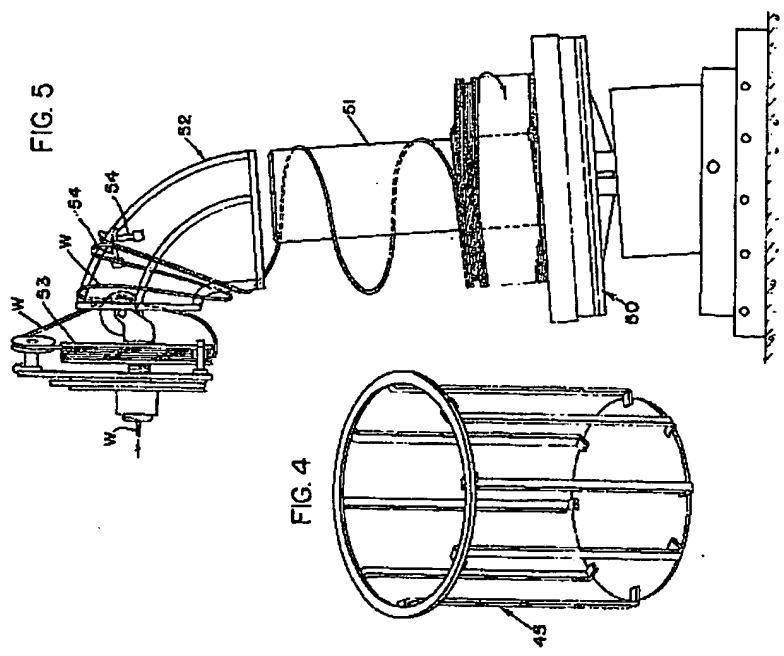


FIG. 4

FIG. 5